
Appendix E. Harm Definition

“Harm” is a concept developed by Malliaris [1] for quantifying, or normalizing, the relative consequences of the total estimated number of crash deaths and injured people. Harm is commonly used for prioritization in crashworthiness program planning.

Harm attributes to each surviving injured person and each death a quantity based on the costs (excluding property damage and travel delay costs) associated with each death or injured person. The cost quantities are obtained from National average cost estimates for injured people. National Harm estimates are developed by multiplying the frequency estimates of the incidence of injured people at each severity level by the unit cost estimates of the average losses for that severity of injury. These figures are then summed to arrive at annual National Harm estimates.

Injury costs are estimated in accordance with the Abbreviated Injury Scale (AIS) of six grades of increasing threat-to-life ranging from AIS 1 (Minor) to AIS 6 (Maximum). Table E1 provides the latest “Economic Harm” figures associated with the maximum AIS for a given crash victim using the latest NHTSA estimates of economic costs and injury incidence. Table E2 provides Comprehensive Harm figures that include quantities representing values for pain and suffering costs that are excluded in the “economic” cost schedule.

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Table E1. 1994 Economic Harm from Crash Injuries

Survivor's Maximum AIS		Unit Costs [2] (1994 Dollars)	Incidence [3]	Economic Harm [4] (Billion Dollars)
Minor	1	\$3,777	4,626,495	\$17
Moderate	2	\$31,164	398,553	\$12
Serious	3	\$98,011	166,845	\$16
Severe	4	\$221,494	17,123	\$4
Critical	5	\$697,533	6,914	\$5
Fatalities	6	\$822,328	40,676	\$33
1994 National Estimate of Total Economic Harm				\$87

Table E2. 1994 Comprehensive* Harm from Crash Injuries

Survivor's Maximum AIS		Unit Costs [5] (1994 Dollars)	Incidence [3]	Comprehensive* Harm (Billion Dollars)
Minor	1	\$10,840	4,626,495	\$50
Moderate	2	\$133,700	398,553	\$53
Serious	3	\$472,290	166,845	\$79
Severe	4	\$1,193,860	17,123	\$20
Critical	5	\$2,509,310	6,914	\$17
Fatalities	6	\$2,854,500	40,676	\$116
1994 National Estimate of Total Comprehensive Harm				\$335

*Comprehensive cost estimates include economic cost components plus values for reduced quality of life.

References

- [1] Malliaris, A., ,Hitchcock, R, Hedlund, J, *A Search for Priorities in Crash Protection*, SAE, 820242, 1982.
- [2] NHTSA, *The Economic Cost of Motor Vehicle Crashes, 1994*, DOT HS 808 425, July 1996, Table 2, p. 8.
- [3] NHTSA, *The Economic Cost of Motor Vehicle Crashes, 1994*, DOT HS 808 425, July 1996, Table 3, p. 9.
- [4] NHTSA, *The Economic Cost of Motor Vehicle Crashes, 1994*, DOT HS 808 425, July 1996, Table 1, p. 7.
- [5] NHTSA, *The Economic Cost of Motor Vehicle Crashes, 1994*, DOT HS 808 425, July 1996, Table A-1, p. 59.